

IN THE CLAIMS

Listing of Claims:

This listing of claims replaces all prior versions, and listings, of claims in the application:

Claim 1 (Currently amended): An apparatus for containing and cooling enriched water for the production of fluorine-18, said apparatus comprising:

a target body with a front face for coupling to an accelerator, said target body having a back end opposite said front face, said target body having an outside surface between said front face and said back end;

a target chamber for holding a volume of enriched water within said target body, said target chamber having an upper wall defined by said target body, said upper wall substantially perpendicular to said front face; and

a first cooling channel ~~spaced a selected distance from~~ running alongside a portion of said upper wall for removing heat contained in said target chamber, said first cooling channel being a conduit defined within said target body, said first cooling channel isolated from said target chamber, said first cooling channel for receiving a cooling fluid.

Claim 2 (Currently amended): The apparatus of Claim 1 further including a second cooling channel ~~spaced a selected distance from~~ running alongside a portion of a back wall of said target chamber for removing heat contained in said target chamber, said second cooling channel in fluid communication with said first cooling channel, said second cooling channel being a conduit defined within said target body.

Claim 3 (Currently amended): The apparatus of Claim 2 wherein said first cooling channel and said second cooling channel are in fluid communication. ~~cooling fluid flows from said second cooling channel into said first cooling channel.~~

Claim 4 (Currently amended): The apparatus of Claim 1 further including a ~~third~~ second cooling channel parallel to said first cooling channel, said ~~third~~ second cooling channel ~~spaced a selected distance from~~ running alongside a portion of said

upper wall, said second cooling channel being a conduit defined within said target body.

Claim 5 (Currently amended): The apparatus of Claim 1 further including a second cooling channel ~~spaced a selected distance from~~ running alongside a portion of a back wall of said target chamber for removing heat contained in said target chamber; a third cooling channel substantially parallel to said first cooling channel, said third cooling channel ~~spaced a selected distance from~~ running alongside a portion of said upper wall for removing heat contained in said target chamber; and a fourth cooling channel substantially parallel to said second cooling channel, said fourth cooling channel ~~spaced a selected distance from~~ running alongside a portion of said back wall for removing heat contained in said target chamber, said second cooling channel, said third cooling channel, and said fourth cooling channel each being a conduit defined within said target body.

Claim 6 (original): The apparatus of Claim 1 wherein said target body is fabricated out of tantalum.

Claim 7 (original): The apparatus of Claim 1 wherein a coolant flowing through said first cooling channel has at least a nearly fully developed flow.

Claim 8 (original): The apparatus of Claim 1 wherein a coolant flowing through said first cooling channel has a Reynolds number indicating a turbulent flow.

Claim 9 (original): The apparatus of Claim 1 wherein said back wall is canted such that said back wall proximal said upper wall is further away from a front surface of said target body than a distal end of said back wall.

Claim 10 (original): The apparatus of Claim 1 wherein said target chamber is shaped such that a quantity of enriched water in said target chamber undergoes natural circulation when bombarded with a particle beam.

Claim 11 (original): The apparatus of Claim 1 wherein said target chamber includes means for inducing fluid flow in the enriched water.

Claim 12 (original): The apparatus of Claim 1 wherein said upper wall of said target chamber has an arcuate cross-section, as viewed from a front vantage point.

Claim 13 (Currently amended): An apparatus for containing and cooling enriched water for the production of fluorine-18, said apparatus comprising:

a target body with a front face for coupling to an accelerator, said target body having a back end opposite said front face, said target body having an outside surface between said front face and said back end;

a target chamber for holding a volume of enriched water within said target body, said target chamber defined by an upper wall and a back wall; and

a first cooling channel ~~spaced a selected distance from~~ running alongside a portion of said upper wall for removing heat contained in said target chamber, said first cooling channel isolated from said volume within said target chamber, said first cooling channel having a length enclosed by said target body; and

a second cooling channel ~~spaced a selected distance from~~ running alongside a portion of said back wall for removing heat contained in said target chamber, said second cooling channel isolated from said volume within said target chamber, said second cooling channel having a length enclosed by said target body, said second cooling channel in fluid communication with said first cooling channel.

Claim 14 (original): The apparatus of Claim 13 further including a third cooling channel substantially parallel to said first cooling channel, said third cooling channel spaced a selected distance from said back wall for removing heat contained in said target chamber, and a fourth cooling channel substantially parallel to said second cooling channel, said fourth cooling channel spaced a selected distance from said back wall for removing heat contained in said target chamber.

Claim 15 (Cancelled):

Claim 16 (original): The apparatus of Claim 13 wherein said target body is fabricated out of tantalum.

Claim 17 (original): The apparatus of Claim 13 wherein said back wall is canted such that said back wall proximal said upper wall is further away from a front surface of said target body than a distal end of said back wall.

Claim 18 (original): The apparatus of Claim 13 wherein said target chamber includes means for inducing fluid flow in the enriched water.

Claim 19 (original): The apparatus of Claim 13 wherein said target chamber is shaped such that a quantity of enriched water in said target chamber undergoes natural circulation when bombarded with a particle beam.

Claim 20 (original): The apparatus of Claim 13 wherein said target chamber is shaped such that a steam jet is formed adjacent a beam strike area adjacent a window covering said target chamber, said target chamber further shaped wherein said steam jet flows to a steam bubble adjacent said upper wall in said target chamber, and said first cooling channel transferring heat from said steam bubble whereby condensing occurs in said steam bubble.

Claim 21 (cancelled):

Claim 22 (original): The apparatus of Claim 13 wherein a coolant flowing through said first cooling channel has a developed flow.

Claim 23 (original): The apparatus of Claim 13 wherein a coolant flowing through said second cooling channel has a fully developed flow.

Claim 24 (original): The apparatus of Claim 13 wherein a coolant flowing through said first and second cooling channels have a developed flow.

Claim 25 (original): The apparatus of Claim 13 wherein a coolant flowing through said first cooling channel has a Reynolds number indicating a turbulent flow.

Claim 26 (original): The apparatus of Claim 13 wherein a coolant flowing through said second cooling channel has a Reynolds number indicating a turbulent flow.

Claim 27 (original): The apparatus of Claim 13 wherein a coolant flowing through said first and second cooling channels have a Reynolds number indicating a turbulent flow.

Claim 28 (original): The apparatus of Claim 13 wherein said upper wall of said target chamber has an arcuate cross-section, as viewed from a front vantage point.

Claim 29 (Currently amended): An apparatus for containing and cooling enriched water for the production of fluorine-18, said apparatus comprising:

a target body for coupling to an accelerator, said target body fabricated of tantalum;

a target chamber for holding a volume of enriched water within said target body, said target chamber defined by an upper wall and a back wall, said back wall canted such that said back wall proximal said upper wall is further away from a front surface of said target body than a distal end of said back wall; and

a first cooling channel ~~spaced a selected distance from~~ running alongside a portion of said upper wall for removing heat contained in said target chamber, said first cooling channel isolated from said target chamber, said first cooling channel sized such that said first cooling channel sustains a developed flow; and

a second cooling channel ~~spaced a selected distance from~~ running alongside a portion of said back wall for removing heat contained in said target chamber, said second cooling channel isolated from said target chamber, said second cooling channel sized such that said second cooling channel sustains a developed flow, said second cooling channel in fluid communication with said first cooling channel.

Claim 30 (original): The apparatus of Claim 29 further including a third cooling channel substantially parallel to said first cooling channel, said third cooling channel spaced a selected distance from said back wall but isolated from said target chamber, and a fourth cooling channel substantially parallel to said second cooling channel, said fourth cooling channel spaced a selected distance from said back wall but isolated from said target chamber .

Claim 31 (original): The apparatus of Claim 29 wherein said upper wall of said target chamber has an arcuate cross-section, as viewed from a front vantage point.

Claim 32 (original): An apparatus for containing and cooling enriched water for the production of fluorine-18, said apparatus comprising:

a means for containing a target liquid for irradiation; and

a means for cooling said apparatus.

Claim 33 (original): The apparatus of Claim 32 wherein said means for cooling includes internal water channels through which a cooling water has developed flow.

Claim 34 (Currently amended): The apparatus of Claim 32 wherein said means for cooling includes a coolant flowing through at least one internal water channel, said first cooling channel has at least one internal cooling channel sized such that said coolant flowing through said first cooling channel has a Reynolds number indicating a turbulent flow.

Claim 35 (New): The apparatus of Claim 29 wherein said first cooling channel has a length enclosed within said target body, and said second cooling channel has a length enclosed within said target body.

Claim 36 (New): The apparatus of Claim 13 wherein said upper wall is substantially perpendicular to said front face.